

PERCEIVED DISCOMFORT ABOUT CLASSROOM CHAIR BY COLLEGE STUDENTS

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ABSTRACT

Students spend the majority of their time in the classroom, classroom chairs and desks are crucial aspects in terms of comfort and focus in the learning environment. The majority of the furniture in the classroom is unable to accommodate children of various ages and body types. This study was conducted to evaluate the comfort level of students with classroom chairs. Post graduate students were taken as sample and was asked to identify body areas experiencing discomfort while sitting and to rate this discomfort using a 4 point likert scale with rating as often, occasionally, always and never. The evaluation of seating discomfort levels revealed the acceptable levels for the users and possible outstanding problems like neck pain, lower leg pain and shoulder pain. The results showed that the main response of discomfort indicated that cramped feeling, neck pain, shoulder pain, and lower leg pain. Overall, there was a significant discomfort level for the students while sitting on chairs and a possible solution put forward is to design a new type of classroom chair made of natural fiber reinforced composite.

KEYWORDS: Anthropometry, Classroom Furniture, Ergonomic Design & Discomfort

Received: Sep 04, 2021; **Accepted:** Sep 24, 2021; **Published:** Nov 24, 2021; **Paper Id.:** IJESRDEC202117

INTRODUCTION

The physical comfort of a student in the classroom is a matter that is sometimes overlooked and should be discussed. Every day, students spend up to 7- 9 hours at their workstations, with about 83 percent of them sitting at tables and chairs that are too low for their body height. As a result, classroom ergonomics is crucial in the learning environment. Pupils spend roughly 80% of their days in school, and 80% of that time is spent sitting in classrooms doing schoolwork, such as reading, drawing, writing, and other activities, which causes pupils to sit in their seats for long periods of time. As a result, classroom furniture should be designed to meet the needs of children, taking into account that they spend the majority of their time at school seated. However, multiple studies have shown that students frequently used furniture that did not correspond to their anthropometric measurements. Misalignment can have an impact on school learning because uncomfortable body postures might decrease students' learning enthusiasm and interest (Saleh K. et al 2011). In the last few decades, many researchers have focused their attention on ergonomics in the workplace. One major concern is that an ergonomic solution, product, or posture lowers the risk of injury to a user while executing a task while also increasing productivity, safety, and comfort. A large number of studies conducted around the world have found a striking mismatch between anthropometric traits and classroom furniture proportions. This mismatch can impact learning, even in the most exciting and entertaining lectures (Hira, 1980), and can lead to musculoskeletal problems such low back discomfort and neck-shoulder pain (Grimmer and Williams, 2004). Many researchers in India have discovered that classroom furniture is not

constructed to accommodate the size of individual students. When young children sit and write, using an ergonomic work station may help them maintain a more effective anatomical alignment. Pupils' sitting postures are commonly influenced by furniture design, classroom activities, and anthropometric pupil measurements in schools. School furniture design is one of the things that helps to reduce anxiety and improves students' concentration during their studies.

It is clear from all of these publications that the ergonomic design of classroom furniture requires further attention. Many authors have attempted to develop equations that match the measurements of classroom furniture to the anthropometry of children. This necessitated the use of anthropometric measurements of the students. Anthropometric measurements of students varied significantly among age groups, within age groups, between genders, and between races. Furthermore, anthropometric data gathered for a specific region would change over time due to changing socioeconomic conditions, necessitating the update of anthropometric measurements made in the studies every five years.

Common classroom furniture was designed to promote a bolt upright posture, which was considered appropriate in the twentieth century. However, instead of encouraging the healthiest posture, it has been discovered that it actually leads to incorrect physical exertion on certain muscles, resulting in poor posture. Given the physical limits, students frequently prefer to use the chairs to sit in various postures.

Review of literature showed that very few studies have been conducted on ergonomic assessment of class room chairs in colleges. Hence the present study was taken up to assess the comfort experienced by college going students regarding the chairs on which they sit for a long time.

Objective

For the students' usability and comfort, an ergonomic chair design and engineering is consequently deemed particularly crucial. In a classroom setting, an ergonomic chair guarantees that pupils are more comfortable and confident. The study's goal was to discover the musculoskeletal and health issues that students who used the classroom chair faced.

MATERIAL AND METHODS

The examination of a classroom chair is carried out in this study. The poll was meticulously organised, taking into account all conventional norms. The poll was limited to 15 people between the ages of 20 and 30 who were enrolled in a postgraduate programme. To conduct the study, a questionnaire was created. A self-administered close-ended questionnaire with a well-structured format was created. The questionnaire was created to collect data on tasks performed, shift work, musculoskeletal disorder (MSD) issues, pain/discomfort frequency, pain severity, and other general health issues encountered while using the chair.

RESULTS AND DISCUSSION

Ergonomics is a field of study that tries to provide a productive work environment for employees and students so that they can complete their tasks efficiently, effectively, and safely. Reduced fatigue and pain in the sitting posture may result from the usage of specially designed furniture. Popliteal height, knee height, buttock popliteal length, and elbow height are the anthropometric characteristics needed to establish furniture dimensions that encourage proper sitting posture. Ergonomic classroom furniture helps students stay motivated and focused throughout lectures. Poor furniture design, on the other hand, is to blame for difficulties with pupils' joints, spines, and ligaments (Rani Lauder, 2008; Oyawale and Dunmade, 2016).

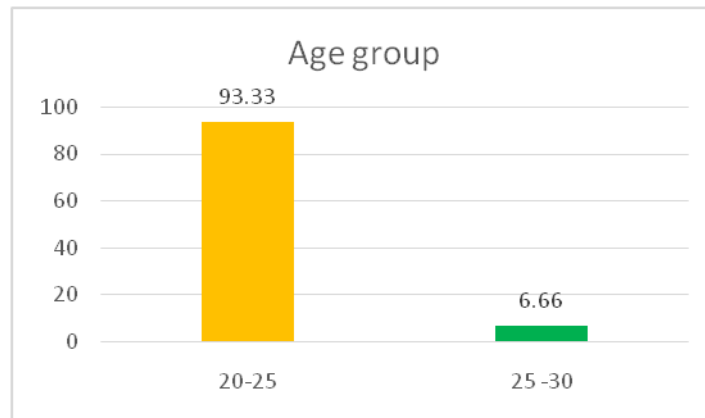


Figure 1: Age Group of the Respondents.

Out of fifteen students, 99 per cent belonged to the age group of 20-25 yrs, while cent per cent of the sample were with right dominant hand.

Table 1: Body Mass Index of the Respondents

S.No.	BMI categories	F	%
1	Underweight <18.5	6	40.00
2	Normal weight 18.5–24.9	5	33.33
3	Overweight 25–29.9	4	26.66
4	Obesity 30 or greater	-	-
Total		15	100.00

With reference to the weight of the students, it was observed that 74kgs was the highest while 40kgs was the lowest weight of the student. About 33.3 per cent of the sample size were found to have height of 5'2 and the least was 4'9.

When it comes to the body mass index of the students, it was observed that 40 per cent were having underweight and 26.66 per cent were having overweight.

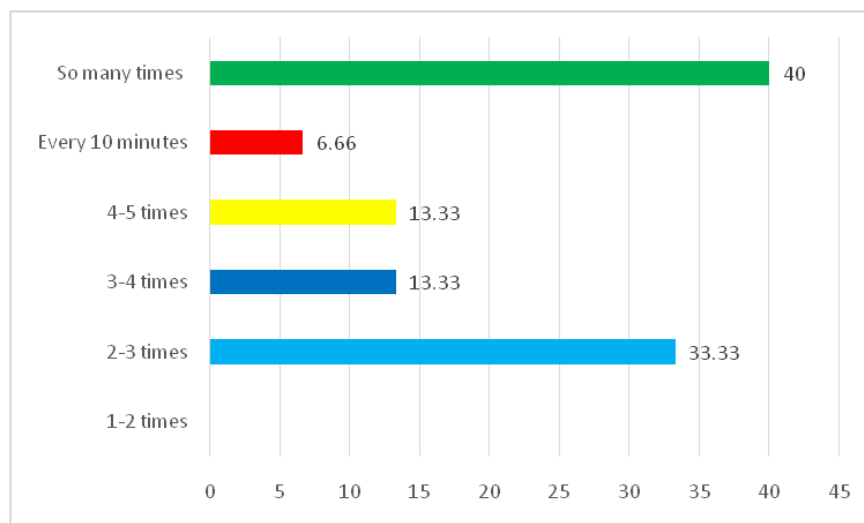


Figure 2: Frequency of Changing Posture During the Class.

Since the students were sitting in those chairs continuously, they felt it was not comfortable due to which 40 per cent kept on changing their posture so many times while 33.33 per cent were changing the posture 2-3 times. An equal percentage of the students kept changing 3-4 times and 4-5 times. Only 6.66 per cent kept on changing their posture every 10 minutes.

Table2: Amount of Time Spent in Class Room Chairs

Sitting in the chair for hours	Frequency	Percentage
1 hour – 2 hours	2	13.33
2 hours – 3 hours	5	33.33
3 hours – 4 hours	4	26.66
4 hours – 5 hours	2	13.33
5 hours – 6 hours	2	13.33
Total	15	100.00

The time spent in sitting position on a particular chair was categorized as

1-2hrs, 2-3 hrs, 3-4 hrs, 4-5 hrs, 5-6 hrs, where about 33.3 per cent of the sample used the chair for 2-3 hrs and lowest were found to use for about 4-6 hrs.

Since they were sitting for a long time, they kept changing the posture during the class. Majority expressed the physical exhaustion due to the postural difficulty. About 46 per cent felt neck pain occasionally and about 20 per cent had always suffered from it. The pains suffered are irrespective of age factor and time duration.

The questionnaire consists of the following rating in relation to the discomforts in body parts. The rating scale was used with four options i.e. often, always, occasionally and never felt the pain by participants while sitting in the chairs for the given amount of time period. The scoring pattern was that more the pain felt, higher the score i.e. 4 for often, 3 for always, 2 for occasionally and 1 for never.

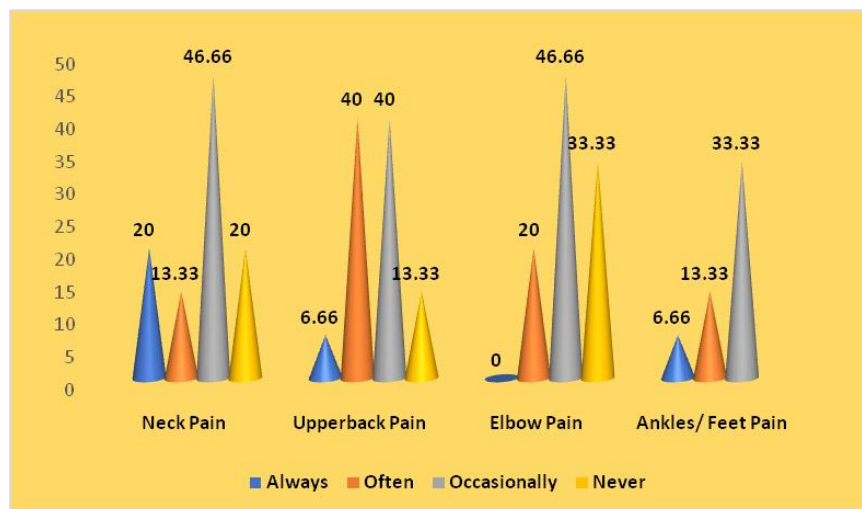


Figure 3: Discomfort Experienced by the Respondents in Various Body Parts.

About 46 per cent found to have elbow pain, also about 33.3 per cent faced no pain at all whereas forearm, wrist pain was seemed to be existent to some extent, thigh pain was not often felt. Shoulder pain and upper back pain was seen in 40 per cent of the respondents. Lower back pain was experienced by 33.3 per cent of the respondents. Hip pain was occasionally felt and where as knee pain was not noticed.

Aside from the physical discomfort that poorly constructed chairs can cause, they can also have an impact on many other aspects of the classroom learning environment. So, here are four essential reasons why good ergonomic classroom seats are so important.

The act of sitting can put a lot of strain on your body. When the spine is properly positioned, a healthy posture offers increased general comfort, as well as improved focus and endurance throughout lengthy periods of seated task work. Recent research studies have looked at how people sit at work and how chairs might help them sit more comfortably and organically.

Table 3: Reasons for Pain Expressed by the Respondents

Body part/cause of the problem	Elbow	Forearm	Wrist/ Hands	Shoulder	Neck	Back	Ankles/lower leg	Knees
Improper height of the chair	5 (33.3)	2 (13.3)	-	9 (60.0)	7 (46.6)	11 (73.3)	3 (20.0)	6 (40.0)
Improper height and width of writing pad	7 (46.6)	-	8 (53.3)	8 (53.3)	-	12 (80.0)	-	-
Shape of Seat back	-	-	-	6 (40.0)	-	12 (80.0)	-	-
Material of the chair	8 (53.3)	-	-	-	-	-	-	10 (66.6)

Reasons stated by the students for having pain in various body parts due to the chair design were numerous. Respondents were suffering from muscle pain and muscle cramps in different body parts due to the improper chair height of chair, improper height and width of writing pad, shape of seat back and material of the chair. Since the chair was made with wood, students felt discomfort as it was hard to sit for a long time. Similarly due to improper height of the chair, either the feet were not touching the floor or knees are extended out of the seat. Even writing pad height was not comfortable for them due to which they had to bend a lot. They were not able to keep the laptop and work on writing pad as width was less.

As previously said, there is much concern about individuals having poor posture as a result of the amount of time they spend seating on poorly built ergonomic seats. However, people begin to acquire these posture patterns at a young age, thus poor sitting habits at such a young age will have a significant impact on our physical well-being in the future. As a result, it's critical that we employ ergonomic seats in the classroom to help students develop excellent posture habits.

Table 4: Suggestions given by the Respondents to Improve the Chair Design

Suggestions	Frequency	Percentage
Writing Pad can be adjustable to avoid strain on neck & elbows	5	33.3
Writing pad should be wide enough and flexible for both writing and also placing of laptops on it	10	66.6
Chair should be cushioned	12	80.0
Concave shape back rest is more flexible to work efficiently	4	26.66
There should be handle on two sides	2	13.3
Chair with adjustable height is needed	5	33.3
Foot rest can be provided	4	26.66

Total exceeds 100 per cent due to multiple responses Suggestions to improve the chair design for comfortable sitting were further explored. Majority of the respondents suggested that chairs should be cushioned because they had to sit

for long hours in those wooden chairs which were very hard to sit. About 66.6 per cent felt that writing pad should be wide enough and flexible for both writing and also to place laptops on that to carry out their work. One-third of the respondents said that writing pad can be adjustable to avoid stress on neck and elbows. It should be as per their shoulder to elbow level height. Nearly one-fourth of the respondents (26.66) suggested that concave shape back rest will be more comfortable and provision of foot rest will give comfort sitting posture. Only negligible percentage mentioned about having handles on both the sides of seat.

CONCLUSIONS

Good ergonomic chairs are far more comfortable and thus allow the students to be in comfortable position. As a result, a variety of learning benefits emerge, including improved attention, memory, and concentration. As a result, it is much easier to assimilate knowledge in this setting. This study has identified MSD and other health problems among the total samples which needs to be addressed quickly. Muscle cramps and discomfort was experienced in different body parts by majority of the respondents. Reason for discomfort caused was due to seating posture for longer duration without breaks, material of the chair, improper height etc. These study findings can be useful for designers and chair manufacturing industry in order to enhance the ergonomic relationship between the human (students) and furniture. Upholstery can be provided to the chair back and seat for comfortable sitting. Since it is done on a small sample, similar study can be conducted on a larger sample. The study implies that chair design needs to be done as per the anthropometric dimensions of 95th percentile which should be made as mandatory for class room chairs.

REFERENCES

1. Hira, D.S. (1980). "An ergonomic appraisal of educational desks. *Ergonomics*," 23, 213-221.
2. Milanese, S., Grimmer, K., 2004. *School furniture and the user population: an Anthropometric perspective. Ergonomics* 47 (4), 416– 426.
3. Al Saleh K. and Ramadan M. (2011). *Are the criteria for health and safety available in adjustable Saudi school furniture? iBusiness*. 3: 205-212.
4. Rani Lauder, V. J. (2008). *Ergonomics for Children: Designing products and places for toddlers to teens*. Boca, Florida, US: Taylor and Francic Group. [8] Onawumi A.S., Oyawale F.A., and Dunmade I.S., (2016) "Ergonomic assessment of school furniture in primary schools in Nigeria," *International Journal of Applied Science and Technology*. 6(1), 92-101.
5. Kumar, Manish, and Bhupinder Singh. "Ergonomic analysis of electric auto rickshaw using CATIA." *Int. J. Mech. Product. Eng. Res. Dev.* 8 (2018): 209-216.
6. Ranganathan, V., and K. Mangaiyarkkarasi. "Consumers' satisfaction Towards Various Product Attributes of Compact Cars and the Problems Faced by the Consumers After Purchase—A Study with Reference to Coimbatore City." *International Journal of Sales & Marketing Management Research and Development (IJSMMRD)* 7.4, Aug 2017, 9-18
7. Imonje, Rosemary, and Grace Nyagah. "Influence of Capacity Building of Academic Teaching Staff in Mainstreaming Disability Interventions for Students with Special Needs In Public Universities in Kenya." *International Journal of Humanities and Social Sciences (IJHSS)* 7.6 (2018): 55-68.